the heat treatment of steel. Many other tool makers have been in the same position. It has, however, been left to Mr. Urquhart, not merely to make a study of the processes involved, but to write a book on them from a practical engineering view-point. In doing this he has rendered a service to his brother engineers which they will probably not be long in recognising, for he has written his book in language which is as free from technicalities as possible.

The time has gone by when steels as received from the makers were forthwith worked into machines, without any preliminary treatment, and when it was not realised that a thermal process could add enormously to their physical strength and effectiveness. In consequence there has been a revolution in the engine and machine building trades within the last few years, which is only realised by the men engaged in those trades. As the author points out, not only have great improvements been introduced in the treatment of well-established carbon steels, but they have been followed by a remarkable development in the use and heat treatment of alloy steels. These advances have necessitated the application of better systems of applying heat and measuring the temperatures produced, and these in their turn have led to the introduction and development of electrical methods of heating, which are capable of a higher degree of control and accuracy.

The early chapters of the book deal with the recent developments in metallography as applied to steels. The author has mastered the theory of the iron-carbon equilibrium, as applied to both carbon and alloy steels, and this is one of the best parts of the whole book. As he points out, one of the most remarkable effects of alloying nickel with mild steel is the lowering of the temperature of the Ac1 range, an effect which means diminished cost of working the steel, a greater margin of safety against over-heating, increased ductility, toughness, and resilience in the finished product. The physical characteristics of steels and testing methods are next described, and these are followed by an outline of thermal processes. Chapters on furnaces and their methods of working come next, and a very good account is given of pyrometers and their application to the thermal treatment of steels. Methods of case-hardening, both by solid and gaseous reagents, are next described, and these are followed by details of the various methods of quenching. Later chapters deal with various types of tools and typical heat treatments, and in the last two chapters accounts are given of the thermal treatment of high-speed tool steels and stainless steels.

To some extent the book is an attempt to co-ordinate the work of the laboratory with that of the engineer's hardening department; and with this end in view, the author has included a series of photomicrographs illustrating the structures of steels at various stages of heat treatment under workshop conditions. He has availed himself of the experience of well-known metallurgists, such as M. Guillet and the late Prof. Howe on the academic side, and of Sir Robert Hadfield, Mr. S. Brayshaw, and Prof. Giolitti on the practical side. There is no doubt that the volume will be widely welcomed by practical men, and it should do much to raise the standard of the scientific heat treatment of tools and machine parts.

H. C. H. C.

Mosquito Control.

Mosquito Eradication. By W. E. Hardenburg. Pp. ix+248. (New York and London: McGraw-Hill Book Co., Inc., 1922.) 15*s*.

IN this small book the author gives a clear and concise account of the measures which have been found successful in controlling mosquitoes in America. The brilliant results of the anti-mosquito work in Havana and the Isthmus of Panama have been fully appreciated in the United States. Dr. G. A. Le Prince, formerly Chief Sanitary Inspector, Isthmian Canal Commission, wrote, in the Annual Report, U.S. Public Health Service for 1920, "The public view-point has changed; villages, towns, county and state officials, as well as business corporations and railroads, now realise the extent of the large preventable financial loss they incur each year. . . . The people have been watching the campaigns undertaken, and throughout the country they are becoming more and more interested in having their own community and state undertake this work. . . . This calendar year, 101 places are doing work under the supervision of the Public Health Service, and have already appropriated $280,000 therefor."

The modern methods of mosquito control are merely elaborations of those originated by Sir Ronald Ross in the East and by General Gorgas in the Canal zone and Cuba; they have already been described very graphically by Le Prince and Orenstein. But Mr. Hardenburg, who is a sanitary engineer, has treated the subject from a somewhat different point of view from that adopted in "Mosquito Control in Panama." Descriptions are given of the more important American culicine and anopheline mosquitoes. These, though brief, are sufficient to enable a sanitary officer to recognise most of these insects that he is likely to meet with; the information given in the body of the book is supplemented, in an appendix, by a more technical key for the identification of both larvæ and adults.

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A good account is given of the preliminary survey work that has to be done before actual operations against the mosquitoes can be commenced. Mr. Hardenburg insists upon the importance of a vigorous propaganda to arouse public interest, and explains, with some humour, how to induce newspaper editors and the " motion picture houses " to " boost " the work.

Drainage of swamps, pools, and salt marshes is dealt with very thoroughly; and detailed directions are given for the construction of drains by handwork or by machinery, for the laying out of a system of tile drainage, and for the construction of tide gates and sluices.

The use of oil and other larvicides, with its advantages and disadvantages, is fully considered; and a whole chapter is devoted to the use of fish to control the mosquitoes. The author writes with enthusiasm on this latter subject, but adopts a more judicial attitude towards the proposal to establish "bat-roosts." The problem of how to deal with the mosquitoes which breed in rice-fields seems to be still unsolved, at least in countries where the people insist upon having rice cultivation near the villages. The habits of the different species of Anopheles, and especially their choice of breeding-places, are so varied that experience gained in one country is not sufficient for dealing with the conditions met with elsewhere. Now, however, thanks to this book, to that of Le Prince and Orenstein, and to Dr. Malcolm Watson's " Prevention of Malaria in the Federated Malay States," public health officers in the tropics are well provided for.

Mr. Hardenburg's book represents the views of a practical man. It can be recommended with confidence to all those who have to deal with sanitation in malarious countries.

The value of the book is much enhanced by the many excellent illustrations with which it is adorned.

H. J. Walton.

Our Bookshelf.

Das feinbauliche Wesen der Materie nach dem Vorbilde der Kristalle. Von Prof. Dr. Friedrich Rinne. 2 und 3 erweiterte Auflage. Pp. viii + 168. (Berlin: Gebrüder Borntraeger, 1922.) 10*s.* 4*d.*

The new edition of Prof. Rinne's book is considerably larger than the first edition, and presents an altogether wider outlook on the fine structure of matter as exhibited in crystals. The whole work is enriched by an originality of treatment which renders it eminently readable and suggestive. Moreover, the excellent portraits of von Groth, Haüy, Schoenflies, Fedorov, Tschermak, von Laue, Debye, Scherrer, Sir William Bragg, and W. L. Bragg give it an altogether special interest. A reproduction of Albrecht Dürer's picture " Melancholie " is also given, in which the representation of a huge crystal occupies a prominent place, the inference being that Dürer was oppressed by the idea of the hopelessness of man's ever rising to the comprehension and explanation of a natural phenomenon so wonderful and remarkable as that of crystallisation. If Dürer lived to-day, however, how different would be his picture! Its title might well be " Hope," or even " Achievement," rather than " Melancholie."

It is this extraordinary success of recent crystallographic and physical research, and particularly that brought about by the use of X-rays in elucidating the arrangement of the chemical atoms in crystals, that forms the main theme of Prof. Rinne's book, and he regards the whole achievement in its more fundamental aspect, as having revealed the true nature of the fine-structure of solid matter. The book is full of illustrations and diagrams of an original character, including many of the X-radiograms of crystals due to Prof. Rinne's own industry. It is a book of very special merit, and one of the most suggestive and far-seeing that have appeared since the inauguration of these fruitful new methods of research.

A. E. H. T.

Elementary Hydraulics for Technical Students. By Prof. F. C. Lea. Pp. vii + 224. (London: E. Arnold and Co., 1922.) 7*s.* 6*d.* net.

Dr. Lea's larger work on hydraulics has long been regarded as an authoritative treatise, and the present volume will be welcomed by many who have felt the need for a less comprehensive work. Beginning with clear accounts of fundamental principles, the questions of the flow through orifices and over notches and weirs are discussed. Next follow the flow through pipes and channels and the methods of gauging the flow of water. Vanes, water-wheels, turbines, and pumps are then considered, and the volume closes with a chapter on hydraulic machines. The treatment throughout is simple, which will render the book suitable for use in technical schools; the drawings are well executed, and the text is very readable. A commendable feature is the description of many experiments which may be carried out on a comparatively small scale with inexpensive apparatus. Any student who works systematically through the experiments described will gain a very fair working knowledge of the methods employed and of the manner in which the results are reduced. The book also contains a number of well-selected exercises, with answers; to some of these exercises hints are appended for their solution, while others are left to the student. Hydraulics is not an easy subject to author or student, and Dr. Lea is to be congratulated upon the present volume, which cannot fail to be of service to both teachers and students.

The Czechoslovăk Republic. By Jaroslav Cisař and F. Pokorný. Pp. vi + 218. (London: T. Fisher Unwin, Ltd.; Prague: Orbis Publishing Co., 1922.) 9*s.* net.

The authors of this volume aimed at compiling a complete handbook to the new state of the Czechoslovak republic and have published an English edition in the hope of spreading a knowledge of their country. There are chapters on the history, topography, population, political organisation, natural resources, industries, trade, transport, etc., with appendices of statistics

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